

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT

In re application of: Pelrine et al.

Attorney Docket No.: SRI1P022/4076-2

Application No.: 09,619,848

Examiner: K. Addison

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Group: 2834

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Response

Title: ELECTROACTIVE POLYMER GENERATORS

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail to: Commissioner for Patents, Box Amendment, Washington, DC 20231 on January 14, 2002.

Signed:

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RESPONSE A

Assistant Commissioner for Patents
Box Amendment Fee
Washington, D.C. 20231

Sir:

This reply and the enclosed remarks are submitted in response to the non-final Office Action mailed on September 13, 2001. Applicants submit that the attached remarks fully address the issues raised in the Office Action.

REMARKS

Claims 1-36 are pending in the application. Claims 1-36 are rejected.

Applicants respectfully request reconsideration of the rejections set forth in the Office Action dated September 13, 2001 in view of the following remarks.

Applicants thank the Examiner for the courtesy extended during the telephonic interview with Applicants' representative on January 10, 2002. During that interview, the claimed invention and rejections under 35 U.S.C. § 112 were discussed.

Rejections Under 35 U.S.C. § 112

Claims 10, 11, 24-25, and 34 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. With respect to claims 10-11, the examiner had rejected the claims on the grounds that the phrase "wherein the polymer has a maximum area strain of at least about 100 percent" is vague and indefinite.

Applicants respectfully submit that the terms "at least" and "about" are sufficiently definite. During the telephonic interview with Applicants' representative on January 9, 2002, the Examiner clarified the rejection with respect to claims 10-11, and questioned whether polymers were capable of the strain levels recited. Applicants affirm that many of the polymers disclosed in the Specification are definitely capable of such strains, and add that some of the polymers disclosed in the Specification are indeed capable strains greater than 200 percent. Accordingly, Applicants respectfully submit that claims 10-11 are not vague or indefinite.

With respect to claim 24, the Examiner is uncertain as to which portion of the polymer is the second portion and which portion is the third portion. Applicants respectfully submit that the claims recite definite structural limitations of the second and third portions, respectively. Namely, the second portion of the polymer refers to a portion of the polymer attached to a frame; and the third portion refers to a portion of the polymer that is deflected to cause a change in electric field in the polymer. The Specification and Figures provide several examples for the second and third portions as recited. For example, FIGs. 1E-F illustrate a device having a polymer 131 attached to a frame 132. In this case, portion(s) of the polymer that are attached to frame 132 may then comprise the second portion of the polymer as recited in independent claim 24. The third portion of polymer 131 corresponds to portion(s) of polymer 131 that are deflected to cause a change in electric field. This may include a substantial region of aperture 133 as shown in FIG. 1F, or a more limited central portion of the aperture as shown by the device of FIG. 1G. Alternately, for the exemplary device of FIG. 2J, the perimetric portions of polymer 272 attached to frame 271 comprise the second portion as recited in claim 24, and the central portion of polymer 272 attached to rigid bar 274 comprises the third portion as recited in claim 24. FIGs. 2A-B and 2N-O also provide additional clarifying examples of second and third portions as recited. Accordingly, Applicants respectfully submit that claim 24 is not vague and indefinite.

With respect to claim 25, and the Examiner has asserted that the phrase "wherein the transducer is stretched before deflection of the third portion of the polymer" is vague and indefinite. Again, the third portion refers to the portion of the polymer that is deflected to cause a change in electric field in the polymer. The Specification on page 12, line 17 to page 13, line 2, for example, describes the rationale for this configuration. More specifically, the polymer may be stretched so as

to allow elastic contraction of the polymer to drive the mechanical to electrical energy conversion. Based on at least this support in the Specification, Applicants respectfully submit that claim 24 is not vague and indefinite.

With respect to claim 34, and the Examiner has asserted that the phrase "wherein the polymer has a compliance in one direction greater than in a second " is vague and indefinite. Support for directional compliance as recited in claim 34 is described in the Specification on page 13, line 27 to page 15, line 26, for example. As described therein, anisotropic prestrain may be applied to a polymer to obtain a particular directional result or directional performance. Based on at least this support in the Specification, Applicants respectfully submit that claim 34 is not vague and indefinite.

Based on the foregoing, Applicants submit that all claims are sufficiently clear and definite, and respectfully request withdrawal of the rejections under 35 U.S.C. § 112, second paragraph.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,518,555 to Ravinet et al. ("Ravinet"). Applicants respectfully disagree.

Ravinet describes a process for manufacturing an electrochemical transducer. The transducer is designed and used for mechanical sound generation.

Ravinet's transducer is manufactured to convert electrical energy into radiative deflection associated with acoustic emission. While Ravinet describes in detail methods for manufacture of several such devices, and in lesser detail the mechanisms of operational sound production, he does not teach or remotely suggest using his polymer to generate electrical energy. Claims 1-36 all recite a generator. In general, Ravinet does not teach or remotely suggest electrical energy generation.

Ravinet does not teach whether his transducers may be feasibly extended to teach mechanical to electrical conversion capability. While Ravinet does mention that his transducers may be used as microphones, microphones are sensors - not generators - and cannot be used to teach a generator. The Office Action asserts that generation in light of the teachings of Ravinet is inherent, but where is the mechanical

energy required for electrical energy generation coming from? Are minute amplitude radiative excitations of a microphone commonly used to generate electricity? What would this power? Applicants respectfully submit that normal air captured over a surface area the size of a microphone that results in radiative level deflections would not be used to generate electrical energy; and that one of skill in the art would not would not generate electrical energy in this manner since the amount of energy would be infinitesimal. Ravinet does not teach or suggest mechanical to electrical conversion, and given the applications discussed by the reference, Applicants submit that this would not be a practical extension of Ravinet.

Despite the lack of teaching in Ravinet towards electrical energy generation using a polymer, the Examiner asserts that is inherent for the structure of Ravinet to operate as a generator. The established rule is that inherency may be relied upon where, but only where, the consequence of following the reference disclosure always inherently produces or results in the claimed invention. *W.L. Gore Associates, Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 314 (Fed. Cir. 1983). If there is not a reasonable certainty that the claimed subject matter will necessarily result, the rejection should fail. *In re Brink*, 164 U.S.P.Q. 247 (CCPA 1970). In the entirety of Ravinet, only air and radiative level deflections are discussed with respect to mechanical energy acoustic production. Based on the foregoing, Applicants submit that electrical energy generation in view of Ravinet is not inherent, and would not be obvious.

In addition, independent claims 1, 21, 24, 28 and 33 all recite a particular mechanism of energy generation. Namely, independent claims 1, 21, 24, 28 and 33 all recite a portion of the polymer arranged in a manner which causes a change in electric field in response to a deflection applied to a portion of the polymer. It is this change in electric field that may be used to move charge and thereby generate electrical energy. Ravinet does not teach or remotely suggest this mechanism of electrical energy generation. More specifically, Ravinet does not teach or remotely suggest a change in electric field in response to a deflection applied to a portion of a polymer.

Claims 2-20, 22-23, 25-27, 29-32 and 34-36 each depend either directly from independent claims 1, 21, 24, 28 and 33, respectively, and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to the independent claims. Further, the dependent claims recite

additional elements which when taken in the context of the claimed invention further patentably distinguish the art of record.

For example, dependent claim 5 recites "wherein electrical energy is removed by the at least two electrodes during the contraction". As detailed the Specification on page 13, lines 16-26, for example, removing electrical energy as the polymer contracts may avoid a situation in which electrical based mechanical pressure within the polymer is sufficient to prevent further elastic contraction; and thus allows increased electrical energy generation from a given mechanical input. It is respectfully submitted that Ravinet does not teach such a limitation.


In addition, dependent claim 9 recites "wherein the polymer has a maximum linear strain of at least about 50 percent". In contrast, Ravinet uses aluminum based electrodes attached to opposing surfaces of his polymer. One of skill in the art will appreciate that metal electrodes as described by Ravinet are conventionally limited to strains of 1-2%. Thus, Ravinet does not teach or suggest a generator as recited in claim 9.

For at least these reasons, withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

Conclusion

In view of the foregoing, Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the number set out below. If any fees are due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account 50-0388 (Order No. SRI1P022).

Respectfully submitted,
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Limited Recognition under 37 C.F.R. §10.9(b)

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